JAPANESE [JP,11-136151,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

Drawing selection

Representative draw

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* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the receiver and transmitter-receiver which are mainly used for wireless-radios machines, such as a cordless remote control, a cordless telephone, and a cellular phone.
[0002]
[Description of the Prior Art]Drawing 7 is a block diagram showing the composition of the conventional transmitter-receiver.
[0003]In drawing 7, a mixer and 10 for 9 a local oscillator and 11 a demodulator circuit and 12 An antenna terminal, 13 an intermediate frequency filter and 14 receiving amplifier and 15 Transmission amplifier, 16 -- as for the 3rd

terminal of a high frequency changeover switch, and 20, the 1st terminal of a high frequency changeover switch and 18 are [a receiving filter and 41] transmission filters a modulation circuit and 40 the 2nd terminal of a high frequency changeover switch, and 19 a high frequency changeover switch and 17.

[0004]Operation of the conventional receiver is explained first. The high frequency signal inputted into the antenna terminal 12 is inputted into the mixer 9 via the switch 18, the receiving filter 40, and the receiving amplifier 14. The receiving filter 40 is used in order to remove the signal of an unnecessary zone, and it comprises band pass filters, such as an SAW filter and an LC filter, here. On the other hand, the output of the local oscillator 10 is inputted into the mixer 9, and the signal from the aforementioned receiving amplifier 14 is changed into an intermediate frequency signal by mixing. Here, the output frequency of a local oscillator is changed according to the channel of choice to receive. An intermediate frequency signal has a zone restricted by the intermediate frequency filter 13 for channel selection, and is inputted into the demodulator circuit 11. And recovery operation is performed by the demodulator circuit 11. The receiver is constituted by the above composition.

[0005]Next, operation of a transmitter-receiver is explained. In a transmitter-receiver, receiving operation is the same as operation of the above-mentioned receiver. However, it is set up so that the 1st terminal 17 and 2nd terminal 18 of a high frequency signal change-over switch that were connected to the antenna terminal 12 at the time of receiving operation may be connected.

[0006]A send action is explained. First, the local oscillator 10 is set as transmit frequency. And the output signal of a local oscillator is modulated by the modulation circuit 20. FM etc. are used for these abnormal conditions. The output signal of the local oscillator 10 is inputted into the transmission amplifier 15, and the output of the transmission amplifier 15 is inputted into the 3rd terminal of a high frequency signal change-over switch through the transmission filter 41. Here, a transmission filter is for mainly removing spurious one of transmission amplifier. And it is set up so that the 1st terminal 17 and 3rd terminal 19 of a high frequency signal change-over switch may be connected. A signal is outputted from the antenna terminal 12. The above is a send action. In a transmitter-receiver, it

communicates by changing above-mentioned receiving operation and send action. The transmitter-receiver is constituted by the above composition.

[0007]

[Problem(s) to be Solved by the Invention]However, the problem of the conventional above-mentioned receiver is easily incompatible in receiving sensitivity and the interference-proof characteristic. That is, the receiving filter is constituted from an above-mentioned conventional example by the preceding paragraph of receiving amplifier. In this case, the input signal from an antenna terminal is decreased by the insertion loss of a receiving filter. For example, if an SAW filter is used for a receiving filter, attenuation of about 5 dB will be produced. Since the S/N ratio of an input signal gets worse by this, sensitivity deteriorates. Although the noise of the output of receiving amplifier is changed by a mixer, since the noise near image frequency is changed into the same frequency in addition to the noise near the channel of choice at this time, a S/N ratio of 3 dB of a mixer output gets worse. A total of sensitivity of about 8 dB deteriorates by these.

[0008]When composition is changed on the other hand and the receiving filter has been arranged in the latter part of receiving amplifier, the sensitiveness deterioration for above-mentioned 8 dB is not generated. However, since receiving amplifier is directly under an antenna terminal, it is directly influenced by an interference. It is the composition which obstacles, such as sensitiveness deterioration, tend to generate by an interference input. Thus, in the conventional receiver, when the receiving filter had been arranged in the preceding paragraph of receiving amplifier, sensitivity deteriorated, and when arranged in the latter part, there was a problem that sufficient interference characteristic was not obtained.

[0009]The problem of the conventional above-mentioned transmitter-receiver is that two, a transmission filter and a receiving filter, are required as a high pass filter in addition to the same problem as the receiver described above. That is, in order that a receiving filter may fill the disturbance characteristics, such as image disturbance and strong input disturbance, the big damping property in an unnecessary-frequencies belt is required. Therefore, it is in the tendency for the insertion loss in a pass band to become large. On the

other hand, as for a transmission filter, in order to raise the efficiency at the time of transmission, it is desirable to make insertion loss as small as possible. Although the transmission filter is required because of spurious removal of transmission amplifier, since this is mainly harmonic content, the damping property as a receiving filter is not required. Thus, since the characteristics called for with a receiving filter and a transmission filter differed, it was difficult to use in common with the filter whose number is one. And it had become the restrictions by a miniaturization and low-cost-izing of a transmitter-receiver to constitute the receiving filter and the transmission filter, respectively.

[0010]An invention solves the above-mentioned technical problem and it aims at providing a receiver compatible in receiving sensitivity and the interference-proof characteristic.

[0011]It can be compatible in receiving sensitivity and the interference-proof characteristic, and aims at providing the transmitter-receiver which realizes a miniaturization and low cost by sharing a receiving filter and a transmission filter further.

[0012]

[Means for Solving the Problem]This invention is considered as composition which connects said 1st high frequency filter element to the preceding paragraph of high frequency amplifier, and connects said 2nd high frequency filter element to the latter part of high frequency amplifier using high pass filter parts which built in the 1st and 2nd high frequency filter elements.

[0013]According to the above-mentioned invention, since the 1st high frequency filter element can remove an interference ingredient and also an interference ingredient and a noise component near the image frequency of a high-frequency-amplifier output can be removed in the 2nd high frequency filter element, it is compatible in the interference characteristic and a sensitivity characteristic.

[0014]

[Embodiment of the Invention]What comprises a demodulator circuit which performs demodulation operation using the output signal of the mixer which mixes by this invention inputting high frequency amplifier, the output signal of said 4th external terminal, and the signal of a local oscillator characterized by comprising the following, and said mixer.

The high pass filter parts which built in the 1st and 2nd high frequency filter elements.
The 1st and 2nd external terminals that were provided in the periphery of said high pass filter part, and were connected to two input/output terminals of said 1st high frequency filter element, respectively.
The 3rd and 4th external terminals that were provided in the periphery of said high pass filter part, and were connected to two input/output terminals of said 2nd high frequency filter element, respectively.
The output terminal connected to the antenna terminal connected to said 1st external terminal, the input terminal connected to said 2nd external terminal, and said 3rd external terminal.
And it is compatible in a receiving sensitivity characteristic and the interference characteristic.
[0015]The high pass filter parts which built in the 1st and 2nd high frequency filter elements, The 1st and 2nd external terminals that were provided in the periphery of said high pass filter part, and were connected to two input/output terminals of said 1st high frequency filter element, respectively, The 3rd and 4th external terminals that were provided in the periphery of said high pass filter part, and were connected to two input/output terminals of said 2nd high frequency filter element, respectively, Receiving amplifier, transmission amplifier, a high frequency signal changeover switch, and a mixer, Have an antenna terminal and said 1st external terminal and said antenna terminal are connected with a local oscillator and a demodulator circuit, Said 2nd external terminal and the 1st terminal of said high frequency signal changeover switch are connected, The 2nd terminal of said high frequency signal changeover switch and the input terminal of said receiving amplifier are connected, The output terminal and said 3rd external terminal of said receiving amplifier are connected, and said 4th external terminal and the output terminal of said local oscillator are connected to the input terminal of said mixer, Said demodulator circuit is connected with the output terminal of said mixer, the 3rd terminal of said high frequency signal changeover switch and the output terminal of transmission amplifier are connected, and the input terminal of said transmission amplifier and the output terminal of said local oscillator are connected, It changes so

that the 1st terminal and 2nd terminal of said high frequency signal changeover switch may be connected at the time of receiving operation, and at the time of a send action, it changes so that the 1st terminal and 3rd terminal of said high frequency signal changeover switch may be connected. It is compatible in a receiving sensitivity characteristic and the interference characteristic, and since a receiving filter and a transmission filter can be shared, miniaturization of apparatus and low cost-ization can be attained.

[0016]The high pass filter parts which built in the 1st and 2nd high frequency filter elements, The 1st and 2nd external terminals that were provided in the periphery of said high pass filter part, and were connected to two input/output terminals of said 1st high frequency filter element, respectively, The 3rd and 4th external terminals that were provided in the periphery of said high pass filter part, and were connected to two input/output terminals of said 2nd high frequency filter element, respectively, Receiving amplifier, transmission amplifier, a high frequency signal changeover switch, and the 1st mixer, The 2nd mixer, the 1st local oscillator, the 2nd local oscillator, and a demodulator circuit, Have an antenna terminal and said 1st external terminal and said antenna terminal are connected, Said 2nd external terminal and the 1st terminal of said high frequency signal changeover switch are connected, The 2nd terminal of said high frequency signal changeover switch and the input terminal of said receiving amplifier are connected, The output terminal and said 3rd external terminal of said receiving amplifier are connected, and said 4th external terminal and the output terminal of said 1st local oscillator are connected to the input terminal of said 1st mixer, Said demodulator circuit is connected with the output terminal of said 1st mixer, and the output terminal of said 1st local oscillator and the output terminal of said 2nd local oscillator are connected to the input terminal of said 2nd mixer, The output terminal of said 2nd mixer is connected to the input terminal of said transmission amplifier, The output terminal of said transmission amplifier and the 3rd terminal of said high frequency signal changeover switch are connected, It changes so that the 1st terminal and 2nd terminal of said high frequency signal changeover switch may be connected at the time of receiving operation, and at the time of a send action, it changes so that the 1st terminal and 3rd terminal of said

high frequency signal changeover switch may be connected. And received frequency and transmit frequency can be set up arbitrarily and receiving operation and a send action can be changed at high speed.

[0017]The high pass filter parts which built in the 1st and 2nd high frequency filter elements, The 1st and 2nd external terminals that were provided in the periphery of said high pass filter part, and were connected to two input/output terminals of said 1st high frequency filter element, respectively, The 3rd and 4th external terminals that were provided in the periphery of said high pass filter part, and were connected to two input/output terminals of said 2nd high frequency filter element, respectively, Receiving amplifier, transmission amplifier, a high frequency signal changeover switch, and a mixer, An orthogonal mixer, a 90-degree phase shift composing device, the 1st local oscillator, and the 2nd local oscillator, Have an antenna terminal and said 1st external terminal and said antenna terminal are connected with a demodulator circuit, Said 2nd external terminal and the 1st terminal of said high frequency signal changeover switch are connected, The 2nd terminal of said high frequency signal changeover switch and the input terminal of said receiving amplifier are connected, The output terminal and said 3rd external terminal of said receiving amplifier are connected, and said 4th external terminal and the output terminal of said 1st local oscillator are connected to the input terminal of said mixer, Said demodulator circuit is connected with the output terminal of said mixer, and the output terminal of said 1st local oscillator and the output terminal of said 2nd local oscillator are connected to the input terminal of said orthogonal mixer, Two output terminals of said orthogonal mixer are connected to the input terminal of a phase shift composing device said 90 degrees, The output terminal of a phase shift composing device is connected to the input terminal of said transmission amplifier said 90 degrees, The output terminal of said transmission amplifier and the 3rd terminal of said high frequency signal changeover switch are connected, It changes so that the 1st terminal and 2nd terminal of said high frequency signal changeover switch may be connected at the time of receiving operation, and at the time of a send action, it changes so that the 1st terminal and 3rd terminal of said high frequency signal changeover switch may be

connected. And the amount of removal of the spurious ingredient of a sending signal can be enlarged.
[0018]The 2nd local oscillation signalling frequency is generated by carrying out dividing of the output of the 1st local oscillator with a counting-down circuit. And an oscillator can be simplified and miniaturization of apparatus and low cost-ization can be attained.
[0019]The 3rd high frequency filter element that was inserted in the preceding paragraph of transmission amplifier and built in the same high pass filter parts as the 1st and 2nd high frequency filter elements is provided. And the amount of removal of the spurious ingredient of a sending signal can be enlarged.
[0020]Let a high frequency filter element be the surface acoustic wave filter constituted on the same piezoelectric material substrate. And a high pass filter can be miniaturized substantially.
[0021]
[Example]Hereafter, the example of this invention is described with reference to drawings.
[0022](Example 1) Drawing 1 is a block diagram showing the composition of the example of the receiver by this invention. In drawing 1, the 1st high frequency filter element and 2 1 The 2nd high frequency filter element, 3 -- high pass filter parts and 4 -- the 1st external terminal and 5 -- the 2nd external terminal and 6 -- the 3rd external terminal and 7 -- as for a local oscillator and 11, high frequency amplifier and 9 are [an antenna terminal and 13] intermediate frequency filters a demodulator circuit and 12 a mixer and 10 the 4th external terminal and 8.
[0023]The high frequency signal inputted into the antenna terminal 12 is inputted into the 1st external terminal provided in the high pass filter parts 3. The 1st external terminal is connected to one input/output terminal of the 1st high frequency filter element 1 built in the high pass filter parts 3, Said high frequency signal is removed in a part of image frequency ingredients or other interference ingredients by the 1st high frequency filter element 1, and is outputted from the 2nd external terminal 5 connected to the input/output terminal of another side of the 1st high frequency filter element 1. The output of the external terminal 5 is amplified by the high frequency rise 8, and is inputted into the 3rd external terminal 6 provided in the high

pass filter parts 3. The 3rd external terminal 6 is connected to one input/output terminal of the 2nd high frequency filter element 2 built in the high pass filter parts 3, An image frequency ingredient and other interference ingredients are further removed by the 2nd high frequency filter element 2, and it is outputted from the 4th external terminal 7 connected to the input/output terminal of another side of the 2nd high frequency filter element 2. And the output of the 4th external terminal 7 and the output of the local oscillator 10 are mixed by the mixer 9, and are changed into an intermediate frequency signal. Channel selection of said intermediate frequency signal is made with an intermediate frequency filter, and demodulation operation is performed in the demodulator circuit 11.

[0024]Having connected and constituted the 1st high frequency filter element 1 and 2nd high frequency filter element 2 from this example before and after the high frequency amplifier 8 has the feature. First, the role of the 1st high frequency filter element 1 is decreasing an unnecessary component so that a big interference signal's may not input into the high frequency amplifier 8. For example, it is necessary to obtain the magnitude of attenuation of 30 dB to an interference frequency component.

[0025]On the other hand, the role of the 2nd high frequency filter element 2 is decreasing the ingredient near image frequency mainly among the input signals to the mixer 9. In order to decrease the ingredient of image frequency also by said 1st high frequency filter element 1, the required magnitude of attenuation should just be obtained together with the 2nd high frequency filter element 2. A total of the magnitude of attenuation of 60 dB can be obtained as the magnitude of attenuation of 30 dB, respectively. Considering securing the interference characteristic as a receiver, although the big magnitude of attenuation is required to the ingredient of image frequency, if distortion does not occur with the high frequency amplifier 8 to other interference frequency components, it is good, and the magnitude of attenuation needed is comparatively small.

[0026]By the way, if the preceding paragraph of high frequency amplifier has a loss, the S/N ratio of an input signal will get worse and sensitiveness deterioration will arise. Therefore, I would like to make small the loss of the preceding paragraph of high frequency amplifier as much as

possible. That is, it is necessary to make small the loss of the 1st high frequency filter element 1. Since the magnitude of attenuation of the 1st high frequency filter element 1 provided in the preceding paragraph of the high frequency amplifier 8 like point ** may be comparatively small, it can make the loss of a pass band small. However, only by the 1st high frequency filter element 1, since the magnitude of attenuation of an image frequency ingredient is insufficient, an image frequency ingredient is further decreased by the 2nd high frequency filter element 2. Since aggravation of the S/N ratio by the 2nd high frequency filter element 2 provided in the latter part of the high frequency amplifier 8 becomes small, the influence on sensitiveness deterioration is small.

[0027]The noise component of the image frequency generated with the high frequency amplifier 8 is removable by having formed the 2nd high frequency filter element 2 that decreases an image frequency ingredient in the latter part of the receiving amplifier 8. The sensitivity of about 3 dB is improved compared with the case where there is no 2nd high frequency filter element 2 by this. And if the loss of the pass band of the 1st and 2nd high frequency filter elements shall be 2.5 dB, respectively, compared with the case where said two filters have been arranged in the preceding paragraph of the high frequency amplifier 8, a sensitivity improvement of about 5.5 dB can be aimed at with the composition of this example. And since the required magnitude of attenuation is securable to an interference by the 1st high frequency filter element 1, it is compatible in a sensitivity characteristic and the interference characteristic.

[0028]In this example, the 1st high frequency filter element 1 and 2nd high frequency filter element 2 are built in the high pass filter parts 3, and each input/output terminal is connected to the 1st, 2nd, 3rd, and 4th external terminals 4, 5, 6, and 7. Therefore, a high pass filter can be constituted small and the miniaturization of apparatus can be attained.

[0029](Example 2) Drawing 2 is a block diagram showing the composition of the 2nd example of the transmitter-receiver by this invention. in drawing 2 -- 14 -- as for the 1st terminal of a high frequency signal changeover switch, and 18, transmission amplifier and 16 are [the 3rd terminal of a high frequency signal changeover switch and 20]

modulation circuits the 2nd terminal of a high frequency signal changeover switch, and 19 a high frequency signal changeover switch and 17 receiving amplifier and 15. The same number was attached and shown about the same component as drawing 1. the feature as a receiver of having described the feature of this example in said Example 1 -- in addition, it is having had composition using the 1st high frequency filter element 1 also as a transmission filter.
[0030]This example has composition of a transmitter-receiver performed by changing receiving operation and a send action. The external terminal 5 provided in the periphery of the high pass filter parts 3 by drawing 2 is connected to the 1st terminal 17 of the high frequency signal changeover switch 16. The 2nd terminal 18 of the high frequency signal changeover switch 16 is connected to the input terminal of the receiving amplifier 14. The 3rd terminal 19 of the high frequency signal changeover switch 16 is connected to the output terminal of the transmission amplifier 15. And at the time of receiving operation, the high frequency signal changeover switch 16 is changed so that the 1st terminal 17 and 2nd terminal 18 may be connected, and at the time of a send action, the high frequency signal changeover switch 16 is changed so that the 1st terminal 17 and 3rd terminal 19 may be connected. Therefore, the 1st high frequency filter element 1 works as a receiving filter at the time of receiving operation, and is working as a transmission filter at the time of a send action. Here, there is a role of a transmission filter in removing the spurious ingredient contained in a sending signal. Since this spurious ingredient is mainly harmonic content, the transmission filter may not need a steep damping property compared with a receiving filter, but its magnitude of attenuation may also be comparatively small. This is the magnitude of attenuation of 30 dB. It is called for rather that the pass loss of a transmit frequency region is small. It can be said that it is the same as the role of the 1st high frequency filter element 1 at the time of receiving operation that it is called for that the loss of a pass band is small. Then, a high pass filter can be shared by transmission and reception by using the 1st high frequency filter element 1 also as a transmission filter. And since it is not necessary to newly form a filter as an object for transmission, miniaturization of apparatus and low cost-ization can be

attained.

[0031]The abnormal conditions of a sending signal can be obtained by modulating the output signal of the local oscillator 10 by the modulation circuit 20.

[0032](Example 3) Drawing 3 is a block diagram showing the composition of the 3rd example of the transmitter-receiver by this invention.

[0033]As for the 1st mixer and 22, in drawing 2, the 1st local oscillator and 24 are the 2nd local oscillator the 2nd mixer and 23 21. The same number was numbered and shown about the same component as drawing 1 and drawing 2.

[0034]The feature of this example is in the method of generating of a sending signal. In addition to the 1st local oscillator 23, the 2nd local oscillator 24 is formed in this example. In addition to the 1st mixer 21, the 2nd mixer 22 is formed. The sending signal is generated by inputting the output of the 1st local oscillator 23, and the output of the 2nd local oscillator 24 into the 2nd mixer 22, and carrying out frequency conversion. Here, if the frequency of the 2nd local oscillator 24 is chosen similarly to the intermediate frequency frequency of receiving operation, it is not necessary to change the frequency of the 1st local oscillator 23 by the change of a transmit receive. Therefore, a transmit receive can be changed at high speed. Although spurious one occurs by mixing by the 2nd mixer 22 at the time of transmission, this can be decreased by the 1st high frequency filter element 1.

[0035](Example 4) Drawing 4 is a block diagram showing the composition of the 4th example of the transmitter-receiver by this invention. In drawing 4, 30 is an orthogonal mixer and 31 is a 90-degree phase shift composing device. The same number was numbered and shown in the same component as drawing 1, drawing 2, and drawing 3.

[0036]There is the feature of this example in generating a sending signal by the orthogonal mixer 30 and the 90-degree phase shift composing device 31. The side-band cancellation mixer consists of an above-mentioned orthogonal mixer and a 90-degree phase shift composing device. The output of the 1st and 2nd local oscillators 23 and 24 is inputted into the orthogonal mixer 30, and two signals which intersected perpendicularly with the difference as an output are acquired. One side of two side bands obtained by mixing is

cancellable by compounding two outputs of this orthogonal mixer 30 with 90-degree phase contrast mutually. Since the spurious level which this generates by mixing operation can be reduced, the magnitude of attenuation of the 1st high frequency filter element 1 can be loosened. And the design which reduces the pass loss of a transmission band further is attained.

[0037]It is possible to usually obtain a cancellation ratio of 20-30 dB by the above-mentioned side-band cancellation mixer.

[0038](Example 5) Drawing 5 is a block diagram showing the composition of the 5th example of the transmitter-receiver by this invention. In drawing 5, 32 is a counting-down circuit. The same number was numbered and shown in the same component as drawing 1, drawing 2, drawing 3, and drawing 4.

[0039]There is the feature of this example in having generated the signal of the frequency which uses a counting-down circuit instead of the 2nd local oscillator used in said Example 3 or 4, and is equivalent to the 2nd local oscillator output.

[0040]The output of the local oscillator 10 is inputted into the counting-down circuit 32, and predetermined dividing is performed. The output of the counting-down circuit 32 and the output of the local oscillator 10 are inputted into the orthogonal mixer 30.

[0041]Since the 2nd local oscillator is omissible by having used the counting-down circuit 32, miniaturization of apparatus and low cost-ization can be attained.

[0042]Although this example used the side-band cancellation mixer which consists of the orthogonal mixer same to generating as Example 4 and 90-degree phase shift composing device of a sending signal, the same mixer as Example 3 may constitute it.

[0043]Although spurious ingredients, such as harmonics, are contained in the output signal of the counting-down circuit 32, these unnecessary components are removable with the 1st high pass filter 1.

[0044](Example 6) Drawing 6 is a block diagram showing the composition of the 6th example of the transmitter-receiver by this invention. As for 33, in drawing 6, the 5th external terminal and 35 are the 6th external terminal the 3rd high frequency filter element and 34. The same number is

attached to the same component as drawing 1, drawing 2, drawing 3, or drawing 4. There is the feature of this example in having connected the 3rd high frequency filter element to the preceding paragraph of the transmission amplifier 15.
[0045]By drawing 6, the 3rd high frequency filter element 33 is built in the high pass filter parts 3, and the input/output terminal is connected to the 5th external terminal 34 and 6th external terminal 35 that were constituted by the periphery of the high pass filter parts 3, respectively. And the 5th external terminal 34 is connected to the 2nd mixer, and the 6th external terminal 35 is connected to the input terminal of the transmission amplifier 15. The role of the 3rd filter element 33 is removing spurious one generated with the output of the counting-down circuit 32, or the output of the 2nd mixer 22. The loss with the filter of a transmission amplifier output can be reduced by considering spurious one of these as the composition removed in the preceding paragraph of the transmission amplifier 15. That is, the spurious ingredient generated by the counting-down circuit 32 or the 2nd mixer 22 is comparatively generated near the transmit frequency. Therefore, as for the filter from which this is removed, pass loss tends to become large. This role is given to said 3rd high frequency filter element 33. Since [which was generated with the transmission amplifier 15 in the 1st high pass filter 1 by doing in this way] what is necessary is to mainly decrease only harmonic content, pass loss can be suppressed small. And the output of the transmission amplifier 15 can be efficiently told to the antenna terminal 12.
[0046]The miniaturization of high pass filter parts can be attained by considering it as the surface acoustic wave filter which constituted the 1st and 2nd high frequency filter elements from composition of Example 1, 2, 3, 4, or 5 on the same piezoelectric material substrate. Furthermore, low cost that a surface acoustic wave filter can be produced in a semiconductor process and the same process and large is realizable.
[0047]A miniaturization and low-cost-izing of high pass filter parts can be attained by considering it as the surface acoustic wave filter which constituted the 1st, 2nd, and 3rd high frequency filter elements on the same piezoelectric material substrate similarly in the composition of Example 6.

[0048]
[Effect of the Invention]According to the receiver of this invention, the following effect is acquired so that clearly from the above explanation.
[0049]Since the 1st high frequency filter element and 2nd high frequency filter element are connected to the preceding paragraph and the latter part of high frequency amplifier, respectively, Since dividing of the signal of a signal source was carried out by the variable divider, the output signal is acquired, since reduction and the interference ingredient of the pass loss of a filter, and the noise component of a high-frequency-amplifier output are removable, and the number of dividing of a variable divider can be set up in an instant, it is compatible in a receiving sensitivity characteristic and the interference characteristic. There is an effect to say.
[0050]Since the high pass filter parts which built in the 1st and 2nd high frequency filter elements are used, a high pass filter can be made small and it is effective in the ability to attain the miniaturization of apparatus.
[0051]according to [so that clearly from the above-mentioned explanation] the transmitter-receiver of this invention -- the effect as the above-mentioned receiver -- in addition, the following effect is acquired.
[0052]It changes with a high frequency switch by transmission and reception, and since a high pass filter can be shared by using the 1st high frequency filter element 1 as a receiving filter and a transmission filter, it is effective in the ability to attain miniaturization of apparatus, and low cost-ization.
[0053]Since the sending signal was considered as the composition generated using a mixer, it is not necessary to change the frequency of a local oscillator, and is effective in the ability to change a transmit receive at high speed.
[0054]Since the orthogonal mixer and the 90-degree phase shift composing device constitute the side-band cancellation mixer, Since the spurious level generated by mixing operation can be reduced and the magnitude of attenuation of a high frequency filter element can be loosened, it is effective in the filter design which reduces the pass loss of a transmission band further becoming possible.
[0055]Since the signal which is equivalent to the 2nd local oscillator with a counting-down circuit is generated, the 2nd local oscillator can be omitted and it is effective in the ability to attain miniaturization of apparatus, and low cost-

ization.

[0056]Since it was considered as the surface acoustic wave filter which constituted each high frequency filter element on the same piezoelectric material substrate, it is effective in a miniaturization and low-cost-izing of high pass filter parts being realizable.

[Translation done.]